migrated from the south China through Myanmar last 150 years ago. In the year 2011, reach to 600,000 people were living in these areas. The difference of culture and life styles of hill tribe people might be vulnerable for HIV/AIDS infection. This objective aimed to investigate the situation of HIV/AIDS among hill tribe marginalized and vulnerable population.

Methods: The retrospective cohort study was conducted. The systematic data extraction from the medical records in 16 hospitals in northern Thailand during 1990-2010 was performed. The six main hill tribe people: Akha, Lau, Karen, Yao, Kmong, and Lisu were the target population. Chi square test was analyzed.

Results: Totally 3130 cases were recruited into the study. 54.6% were male and 45.4%were female. The HIV/AIDS case had been reported in 1990, and the highest incident case had reported in the year 2004 with 461 cases followed by 2005 (343 cases), and 2006(302 cases) respectively. The highest cumulative case had been reported from Mae Fah Luang Hospital (25.8%), followed by Mae Suai hospital (18.8%). 46.0%were Akha, 19.7%were Lahu, and 9.5% were Yao. 38.8%were 31-40 years old, followed by 21-30 years old(33.6%), and 41-50 years old (13.4%). 44.4%were agriculture, 32.0% were employee, and 8.0% were un-specify. 91.6% were infected by sexual intercourse, 5.7% were mother to Child, and 0.5% were IDU. 66.7% were alive, and 65.8% were diagnosed as full born AIDS. 24.0% were receiving ARV, 30.7 were receiving OI treatment, and 9.5% were tested CD4 level. Male had higher of survival rate than female (p-value > 0.001), and male were younger than female at the age of infection (p-value > 0.001). There was statistically significant difference of mode of infection by tribe ((p-value > 0.001).

Conclusion: Specific health education programs and empower them for using condom are needed to setting up for HIV/AIDS prevention and control among hill tribe people in Thailand.

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Couples' voluntary HIV counseling and testing in antenatal care services: Implications for prevention of mother-to-child transmission of HIV

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Background: The majority of new HIV infections in sub-Saharan Africa are acquired in marriage. In Zambia, one in ten couples has different HIV results. Couples' Voluntary HIV Counseling and Testing (CVCT) decreases annual transmission rates within discordant couples by an estimated two-thirds and also reduces the incidence of new infections in concordant HIV- couples.

CVCT has particular importance for Prevention of Mother to Child Transmission of HIV programs. CVCT allows prevention of HIV transmission from: (1) HIV+ male partners to HIV- pregnant woman (especially during pregnancy); (2) HIV+ pregnant women grating CVCT with antenatal care (ANC) services, less than 2% of pregnant women were tested with their partners in Lusaka and Ndola government clinics in 2010.

Methods: In April 2011, the Zambia Emory HIV Reseach Project (ZEHRP) began implementing CVCT as a service integrated into ANC in one district government clinic in Lusaka, Zambia. By using community promotion, health talks within the clinic, and fast tracking of clients who attended ANC services as a couple, Kanyama clinic was able to establish a social norm for husbands to attend at least the first antenatal visit together with their partner. All couples underwent the entire HIV counseling and testing process (pre-test, lab test, and post-test) together as a couple.

Results: Prior to April 2011, Kanyama clinic tested approximately 6 pregnant women per month together with their partner. Subsequent to the integration of the services, Kanyama clinic has reached 128 pregnant women on average per month to be tested together with their partner. Of these couples, approximately 64% were concordant negative, 21% concordant positive, 9% discordant with the male as the index partner (M+/F-) and 7% discordant with the female as the index partner (M-/F+).

Conclusion: Because this service is based at the government clinic and all CVCT counselors are government employed nurses or lay counselors, referrals for ART and PMTCT have been better streamlined.

ZEHRP is currently working on further expanding CVCT integration with ANC to all government clinics in Lusaka and Copperbelt Provinces.

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Characterizing HIV prevalence distribution across subpopulations at variable levels of sexual behavior

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Background: The determinants of the large HIV prevalence in the low risk general population in sub-Saharan Africa are poorly understood. Comprehending the dynamics of HIV infection transmission requires an understanding of how variability in human sexual behavior can influence the distribution of HIV infection in a population. We explored the role of sexual behavior heterogeneity in HIV epidemiology.

Methods: A population-level deterministic compartmental model was constructed to examine HIV epidemiology at variable levels and forms of sexual behavior heterogeneity. The model was parameterized by state of the art empirical data and was described by a system of coupled nonlinear differential equations. The model accommodates arbitrary diversity in the sexual risk distribution and variable mixing between the different risk groups in the population. We investigated generic features of the distribution of HIV infection in human populations.

Results: HIV prevalence distribution across the risk groups was found to follow a logistic function with an inflection point (point of dynamical transition) occurring at roughly the same risk group irre-

spective of the sexual-risk distribution. This pattern is suggestive of a modulated threshold effect. We found that this effect reflects a modulated form of the *R0* = 1 sustainability threshold. The vast majority of HIV transmissions were found occurring from infected persons in the higher risk groups, though lower risk groups contributed as much as one-third of HIV acquisitions. The incidence rate was found to follow a power law and to be a direct measure of the level of risk.

Conclusion: Our study indicates distinctive patterns for the distribution of HIV infection in human populations. HIV transmission dynamics is dominated by the behavior of individuals in the higher risk groups above an HIV sustainability threshold, while the lower risk groups are still at risk as the receptive ends of HIV transmission chains. The presence of mixing in the population merely acts to modulate this threshold by allowing some HIV prevalence in the lower risk groups and a smooth transition of prevalence to the higher risk groups.

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Coverage and acceptance of prevention of mother-to-child transmission services amongst pregnant women attending ante-natal clinics - Oyo state, South-Western Nigeria, 2010

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Background: Nigeria contributes 15-30% of global gap on Prevention of Mother-to-Child Transmission (PMTCT). In pregnancy, risk of Human immunodeficiency virus (HIV) transmission is 30%-45%, reducible to < 2% with PMTCT services. Oyo's population of 6,392,365 (women of childbearing ages-22%) and HIV prevalence 3.0% in 2010, created a high need for PMTCT. We conducted this study in October 2011 to determine PMTCT service coverage and acceptance amongst pregnant women (PW) attending ante-natal care (ANC) with a view to making recommendations.

Methods: We used retrospective cohort study design as Health Facilities (HF) health records review from January-December 2010.We desk reviewed all HF in the state for those offering PMTCT to determine coverage/acceptability/ownership. We extracted data on ANC attendance, HIV screening, antiretroviral (ARV) prophylaxis, positive (+) PW's delivery for PW aged 15-49 years who attended ANC for the period. We conducted analyses for frequencies/proportions using MS Excel.

Results: Of 1,169 HFs, 10 (0.9%) located in 8/33 LGA (24%) offered PMTCT. 5/10 (50%) were private-owned. 90,982 (28.5%) of 319,618 annual PW in state had at least one ANC visit. 36,804/90,982 (40.5%) seen/had access to PMTCT service in the 10 HF, representing 36,804/319,618 (11.5%) of all PW. 36,740 (99.8%) of these accepted HIV screening. Among those screened 36,634 (99.7%) received result, 615 (1.7%) were reactive, all 615 accepted infant feeding/family-planning counseling. 523(85%) HIV + PW were placed on ARV prophylaxis, 317 babies born to HIV + PW.

Conclusion: PMTCT coverage and ANC attendance in Oyo State were poor. Most PW couldn't access PMTCT, creating HIV risk for unborn child. Its acceptance was high in HF offering it. Recommendations and advocacy were made. PMTCT scale-up plans are being developed to achieve universal access and zero transmission in pregnancy.

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HIV prevention randomized clinical trials: quantitative and analytical insights on the failure to measure efficacy

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Background: During the nearly 30 years of research on HIV, more than 40 randomized controlled trials (RCT) have been designed to measure the efficacy of interventions on HIV incidence ranging from HIV vaccines to behavioral interventions. Despite the solid foundation on observational epidemiological evidence, nearly 90% of the RCTs failed to measure a statistically significant efficacy against HIV incidence. The reasons behind the failure of most RCTs to measure efficacy continue to be poorly understood. In this study, we implemented *in silico* simulations of an RCT to explore the drivers of the failures of a landmark HIV clinical trial to measure a statistically significant efficacy.

Methods: We simulated the Partners in Prevention HSV/HIV transmission study designed to test the efficacy of herpes simplex virus type 2 (HSV-2) suppressive therapy by acyclovir in reducing HIV transmission. We also simulated different variations of this trial, and the Rakai male circumcision trial. We developed individual-based Monte-Carlo models parameterized by the data of these RCTs and simulated the RCTs 1000 times. To measure the efficacy of the intervention, we conducted a log-rank survival analysis for each RCT realization and estimated the statistical power as the fraction of realizations that rejected the null hypothesis.

Results: Our analyses indicated that the Partners in Prevention RCT had only 14% likelihood to observe a statistically significant efficacy for the intervention. In contrast, a different and more potent regimen for HSV-2 suppression had 87% chance of observing a statistically significant efficacy. For the Rakai male circumcision trial simulation, 94% of the RCT realizations showed statistically significant efficacy for the intervention.

Conclusion: Our results suggest that the outcome of the Partners in Prevention trial could have been anticipated, at least to some extent. The simulations indicate that several unexpected odds have colluded to undermine the statistical power of the study, and therefore it would be premature to discredit the concept of acyclovir therapy for HIV prevention based on the outcome of the Partners in Prevention trial. Our study highlights how *in silico* simulations of RCTs can provide powerful tools to enhance the success of any HIV intervention RCT.

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